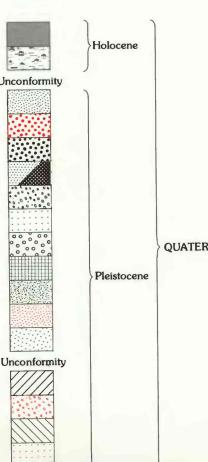


EXPLANATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

dunes, and backdune flat. Sediments of the foreshore consist of white to light-brown, fine- to coarse-grained quartz sand with some fine pebble gravel, small amounts of mica, and locally abundant shell fragments. Dark minerals commonly outline stratification. Coarser grained sand commonly increases with depth. Sediments of the berm are chiefly pale-yellow to light-brown, fine-medium-grained quartz sand with few thin coarse-grained sand layers. Dark minerals outline small wind-driven ripples within beds of the berm. Sediments grade from wave deposited at the seaward berm ridge to eolian over the landward part. Dune areas are irregular and marked by numerous closed depressions up to 12 feet deep. Dune crests are commonly 18 to 27 feet above sea level; large solitary dunes up to an elevation of 40 feet and 0.2 to 0.4 miles in diameter are present landward of the shore dunes south of False Cape. Shore dunes consist of pale-yellow to light-brown, medium- to very fine grained quartz sand with 1 to 3 percent silt and 1 to 5 percent mica. Elsewhere, dune stratification consists of nearly horizontal laminae that have low-angle pinchouts. Sediments of the backdune flat are dark brown to pale yellowish-brown, fine- to medium-grained sand with variable admixtures of very fine sand, coarse sand, silt, clay, and vascular plant fragments. The abundant mica probably is blown in from the dunes together with silt. Thickness ranges from 1 to 20 feet. (Oaks and

Undivided sediments (Holocene)—Beach, marsh, swamp, and stream sediments. Along portions of existing streams above tidewater, clean to clayey, fine- to medium-grained sand and sandy silt are being deposited. Along portions of streams directly affected by tides, especially the James River, deposits of fine- to medium-grained sand with some fragments of oysters and fine pebble gravel are common. Thickness

Unit A (upper? Pleistocene)—Medium- to coarse-grained sand, gravelly in part, commonly strongly trough crossbedded; interfingers and overlaps westward with very fine to fine clayey and silty sand and clayey silt. A barrier island or barrier spit complex characterized by Carolina Bays.

commonly trough crossbedded. A barrier island or barrier spit complex. Unit C (upper Pleistocene)—Fine- to medium-grained sand, clayey and silty in part, massively to horizontally bedded, characterized by a few

Unit D (D1) (Late Pleistocene)—Fine- to medium-grained sand, gravelly near base. Deposited on very near shore shelf environment. Unit D is equivalent to Unit D1 and is shown in darker color. (Robert B. Mixon,

Unit E (Pleistocene)—Fine- to medium-grained sand, clayey and silty in the north; moderately sorted to well sorted in the south. Some gravel near the base and along scarps that bound the unit on the east. Deposits

of an ancestral Chesapeake Bay. (Robert B. Mixon, written commun. Unit F (Pleistocene)—Beach ridge complex. Ridges of generally medium-

clayey-sand facies. Composition of the clayey-sand facies ranges from clayey sand, silt, and clay, to well-sorted, fine- to medium-grained sand. Low-angle, planar cross laminae occur in sandier parts of the facies, together with plates and angular chunks of clay. The base of the clayeysand facies slopes toward present streams so that the minimum total thickness of this facies, exposed above sea level, is 25 to 30 feet near

Sand Bridge Formation¹ (Pleistocene)—Fluvial and lagoonal silty-sand facies. Consists of fine- to medium-grained sand with 20 to 30 percent silt. It lacks obvious stratification, sedimentary structures, and fossils. This facies is 5 to 8 feet thick, and its top lies entirely above 18 feet. The silty-sand facies is oxidized only 2 to 3 feet below the surface. The clay-sized fraction includes more than 20 percent vermiculite, 5 to 20 percent illite, 5 to 10 percent feldspar, and considerably more than 20

Sand Bridge Formation1 (Pleistocene)—Marsh and tidal flat silty-clay facies. Consists of approximately equal amounts of clay and silt with 10 to 15 percent fine- to medium-grained sand, especially near its base. The silty-clay facies in many places has a blocky, massive texture with-

out stratification and is cohesive; locally, however, rather continuous but irregular wavy beds to 0.3 foot thick are present. Unoxidized color varies from dark gray to very light gray. Yellowish-brown limonitic mottling is common in many places. The clay-sized fraction consists of vermiculite, chlorite, illite, and feldspar in amounts less than 5 to 20 percent each, 5 to 30 percent montmorillonite, and 60 and 80 percent quartz. (Oaks and Coch, 1973, p. 94)
Sand Bridge Formation¹ (Pleistocene)—Barrier-sand-ridge and mud-flat

complex. Ridges are underlain by linear bodies of white to light-gray, fine to very fine grained quartz sand with a trace of silt, and 3 to 6 percent mica, which overlies compact, light-yellow to yellowish-brown, fine- to coarse-grained quartz sand with 1 to 5 percent fine pebble gravel. The upper sand has a characteristic dry, fluffy feel similar to that of modern dune sand, and it interfingers with the silty-clay facies in the western part of Pungo Ridge. Stratification in cores is low angle, 0.5 to 2 inches thick, and marked by concentrations of opaque minerals in both sand bodies. Light yellow and yellowish-brown oxidation and clay enrichment extend to depths of 3 to 6 feet in the upper sand body. Thickness, 18 feet. (Oaks and Coch, 1973, p. 94-95) $Kemps ville\ Formation ^{1}\ (Pleistocene)\ in\ southeastern\ Virginia-Beach\ and$

dune sand and gravel in Hickory scarp; minor marsh clay among west

margin of unit. The Kempsville generally consists of fine- to coarse-

grained sand with minor amounts of fine pebble gravel. The sand is composed chiefly of angular to subrounded quartz with 1 to 3 percent opaque minerals and with rounded, broken shell fragments. Locally, the Kempsville sand interfingers westward with silty, very fine sand, clay and soft peaty clay. The Kempsville Formation is oxidized yellow to acts as a binder and makes the sand very hard when dry. (Oaks and Coch, 1973, p. 81) Elsewhere in the Coastal Plain of Virginia, the unit is Pleistocene(?) shoreline sands, as inferred from strong relict beach morphology and from county soils maps that show soil types with predominant sand in

the C horizon. All sandy environments of the shore and barrier complex are probably included in the bodies mapped. Thickness, 10 feet. (Force and Geraci, 1975) Norfolk Formation¹ (upper Pleistocene)—Shelf fine-sand facies. The fine-sand facies consists of light bluish gray, fine sand to silty, fine- to very fine grained sand, with 3 to 8 percent mica and 1 to 5 percent dark minerals. Locally, clayey sand and sandy clay are abundant. The composition of this facies is highly variable laterally. Laminae are chiefly

horizontal and outlined by dark minerals but locally dip as much as 10 degrees. (Oaks and Coch, 1973, p. 76) Norfolk Formation¹ (upper Pleistocene)—Fluvial and estuarine clayey sand facies. Sand, light-gray to tan, medium- to fine-grained, pebbly

locally, 1 to 4 percent heavy minerals, thin- to thick-bedded, with lenses of clay (up to 8.2 feet) and peat and organic-rich clay (up to 7.6 feet) locally. (Johnson, 1972, p. 32) Norfolk Formation¹ (upper Pleistocene)—Marine sandy clay. This facies is the surficial stratigraphic unit over most of the Hampton flat and ranges

in thickness from 10 to 15 feet. A cobble zone with flattened quartzose boulders up to 12 inches in diameter commonly marks the unconformity between the sandy clay facies of the Norfolk and the underlying Yorktown Formation. The sediments in the lower part of the sandy clay facies are sandy clay and clayey sand with varying proportions of pea gravel. These sediments are unsorted and in places stained reddish brown. In the upper part of this facies, the amount of sand diminishes eastward. Because of the high water table over much of the area, oxidation has not taken place to depths greater than 3 feet. (Johnson, 1972, p. 36)

Norfolk Formation¹ (upper Pleistocene)—Marine silty sand. This facies of the Norfolk Formation crops out in ridges on Goodwin Islands, Crab Neck, and Plumtree Island. The ridges are composed of fine- to medium-grained sand, with less than 10 percent silt and clay. Small quantities of gravelly sand occur locally on the ridges. On the broader ridges, the sediments are slightly finer on the west side than on the east side. The sand on the crest of the ridge lacks distinctive primary sedimentary structures and shows shallow weathering profiles. This facies is usually less than 10 feet thick. (Johnson, 1972, p. 37)

¹As mapped by Oaks and Coch (1963, 1973)

Sediment and radiometric sample locality Sediment sample locality (Force and Geraci, 1975) Aeroradiometric anomaly investigated but not sampled Radiometric sample